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INDIA

with them along with weather analysis and weather forecasting make up the last two chapters of the book.

In this thoroughly revised and enlarged edition, retaining the basic structure of the book, some new materials have been added to almost every chapter. The chapter on the monsoon has been virtually re-written. The readers, to their pleasant surprise, will find that all the maps and diagrams in the present edition have been re-drawn to make the subject more comprehensible and more useful. An appendix containing 120 multiple-choice type questions along with their direct answers has specially been designed to meet the requirements of those preparing for and appearing in various competitive examinations.

Last but not the least, under certain unavoidable circumstances the publication rights of the book have been transferred to M/S Sharda Pustak Bhawan, Allahabad. In the present edition, the readers will find that the shortcomings of the earlier editions have been removed and printing mistakes rectified. All praise to the present publisher!

It is hoped that the book will be useful for the students of the subject at the university level and also for those appearing in various competitive examinations.

Sharda

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Introduction

Weather and climate are dynamic features of our physical environment. They affect a wide range of human activities to a greater or lesser degree. There is no denying the fact that weather and climate are important factors in determining our day-to-day and longer term activities and modes of life. Though it would not be desirable to produce an exhaustive catalogue of climatic impacts, it is true that the ways in which the elements of climate and weather control various forms of economic and social activity are now receiving ever increasing attention from climatologists. Dyer has aptly remarked that there are no more fundamental environmental components than the air we breathe, and the sunshine and rainfall that nourish our crops. Because of the growing awareness of our environment, there has developed the concept of a finite earth. A grave concern is being expressed with the problems posed by shrinking resources and increasing population. But there is hardly any realisation of the fact that there is a finite atmosphere and that the atmospheric resources are limited. In Maunders' view, man is affected by the atmosphere, and by information about the atmosphere. Besides, man reacts to the atmosphere through his ability to make decisions. To quote J.E. Hobbs. "To these can be added the role of man himself as a climatic factor of growing interest and concern, particularly with regard to his role as a cause of atmospheric pollution, perhaps leading to climatic change."

Moreover, human society has developed to such an extent that its activities unintentionally produce weather and climate modification on a large scale. Besides modification of local climate, highly sophisticated human activities have the potential to modify global climate. There is no denying the fact that our present technology is in a position to bring about short-term as well as long-term changes in some areas of weather and climate. There are, of course two long-term effects of climate modification that are causing grave concern. One is said to be the observed increase of carbon dioxide gas in the atmosphere and the resultant increase in global temperature expected by the middle of the next century. The other is the prediction of changes in the ozone shield which may give rise to the penetration of more and more of harmful ultra-violet rays of the sun.

It may be pointed out that all of man's efforts towards weather modification may lead to serious meteorological consequences. Large-scale activities such as crop protection, artificial precipitation, hail suppression and fog dissemination